

KSRA Learning Academy
KSRA Learning System

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What Is Object- Orientation?



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➤ Activity Diagrams

In This Lecture You Will Learn:

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- ▶ The purpose of activity diagrams
- ▶ The notation of activity diagrams
- ▶ How to draw activity diagrams



Drawing Activity Diagrams

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- ▶ Purpose
 - ▶ to model a task (for example in business modelling)
 - ▶ to describe a function of a system represented by a use case
 - ▶ to describe the logic of an operation
 - ▶ to model the activities that make up the life cycle in the Unified Process



Notation of Activity Diagrams

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▶ Actions

- ▶ rectangle with rounded corners
- ▶ meaningful name

▶ Control flows

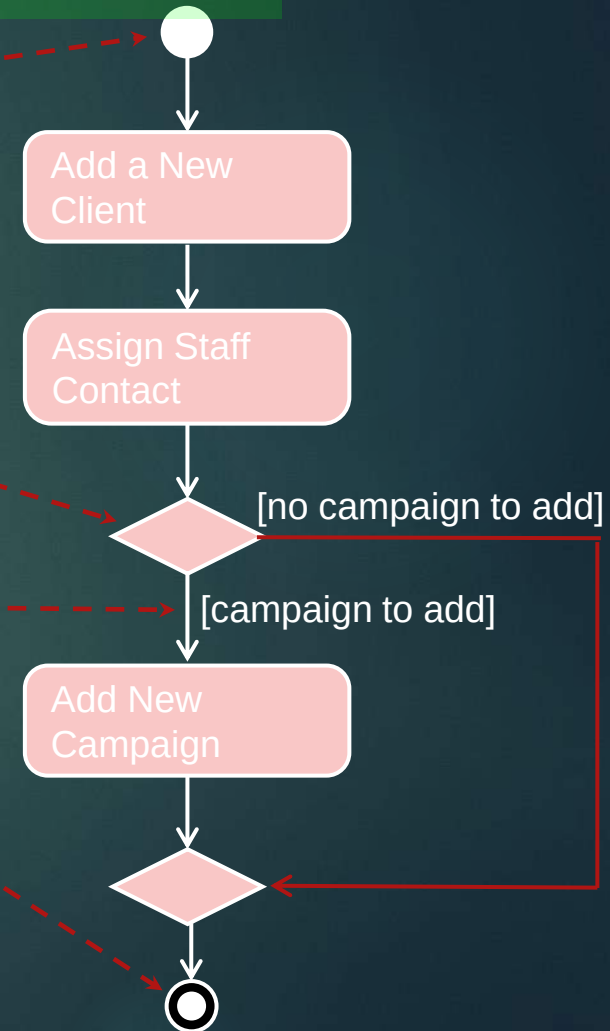
- ▶ arrows with open arrowheads



Notation of Activity Diagrams

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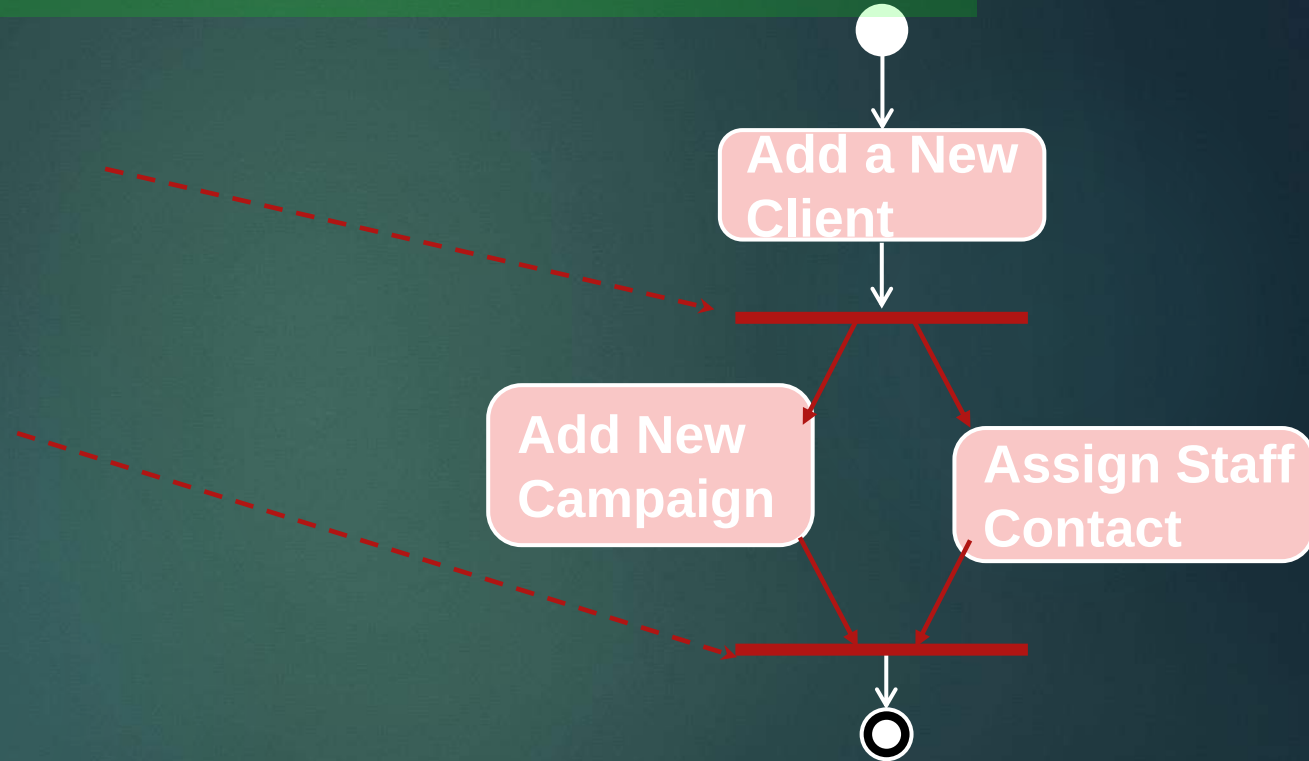
- ▶ Initial node
 - ▶ black circle
- ▶ Decision nodes (and merge nodes)
 - ▶ diamond
- ▶ Guard conditions
 - ▶ in square brackets
- ▶ Final node
 - ▶ black circle in white circle



Notation of Activity Diagrams

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- ▶ Fork nodes and join nodes
 - ▶ thick bar
- ▶ Actions carried out in parallel



Notation of Activity Diagrams

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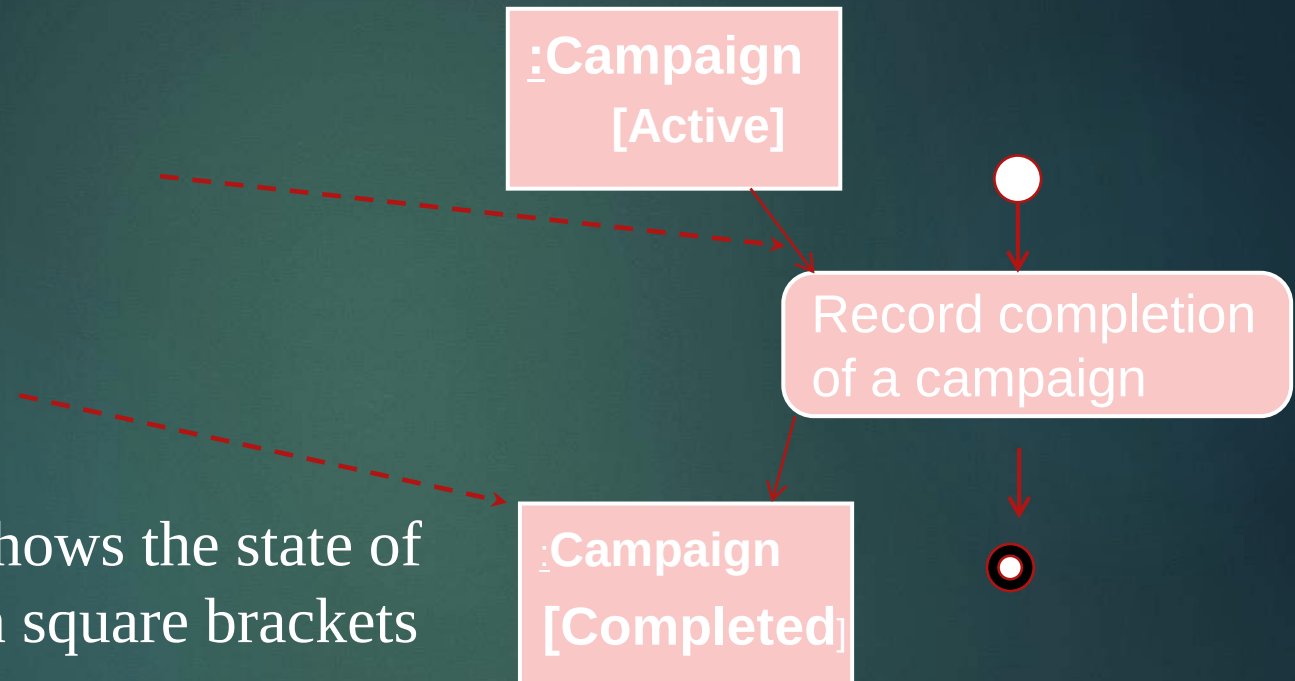
- ▶ In UML 1.X multiple flows from an action were implicitly Ored
- ▶ In UML 2.0 they are implicitly ANDed
- ▶ Guard conditions do not have to be mutually exclusive, but it is advisable that they should be
- ▶ Decisions should be strictly nested, but...
- ▶ ... a merge point can be combined with a following decision point



Notation of Activity Diagrams

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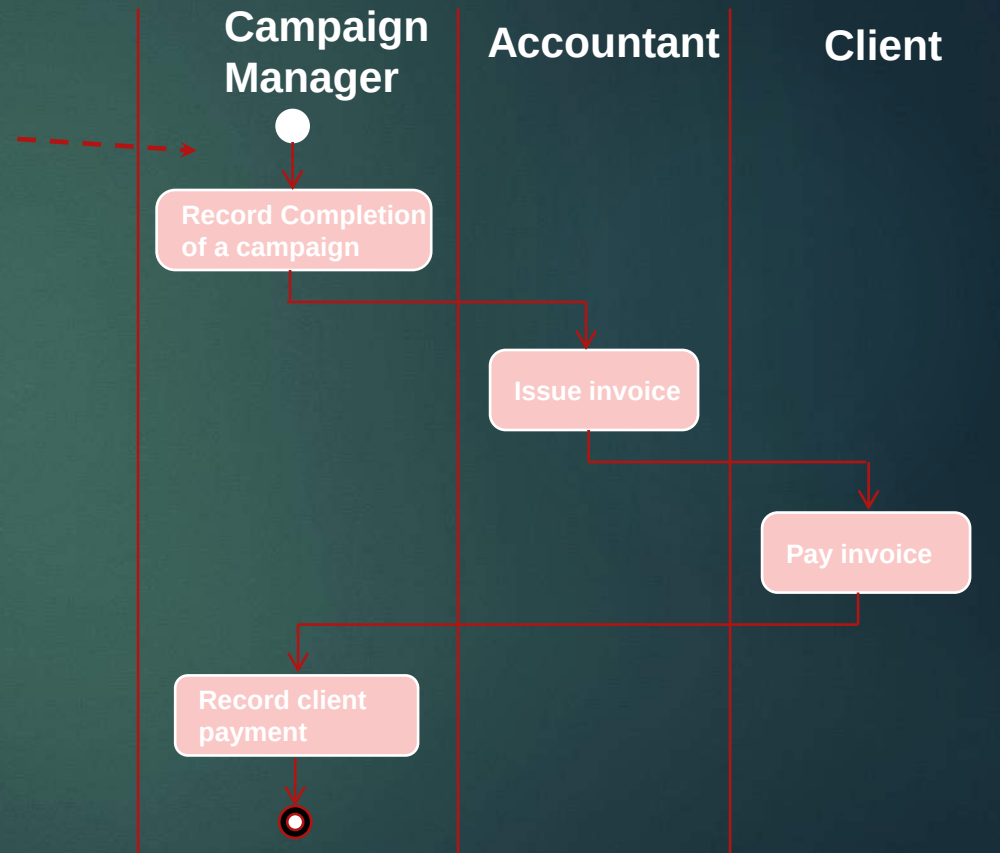
- ▶ Object flows
 - ▶ open arrow
- ▶ Objects
 - ▶ rectangle
 - ▶ optionally shows the state of the object in square brackets



Notation of Activity Diagrams

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- ▶ Activity Partitions (Swimlanes)
 - ▶ vertical columns
 - ▶ labelled with the person, organisation, department or system responsible for the activities in that column



Drawing Activity Diagrams

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- ▶ What is the purpose?
 - ▶ This will influence the kind of activities that are shown
- ▶ What is being shown in the diagram?
 - ▶ What is the name of the business process, use case or operation?
- ▶ What level of detail is required?
 - ▶ Is it high level or more detailed?



Drawing Activity Diagrams

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- ▶ Identify actions
 - ▶ What happens when a new client is added in the Agate system?
 - ▶ Add a New Client
 - ▶ Assign Staff Contact
 - ▶ Add New Campaign
 - ▶ Assign Staff to Campaign
- ▶ Organise the actions in order with flows



Drawing Activity Diagrams

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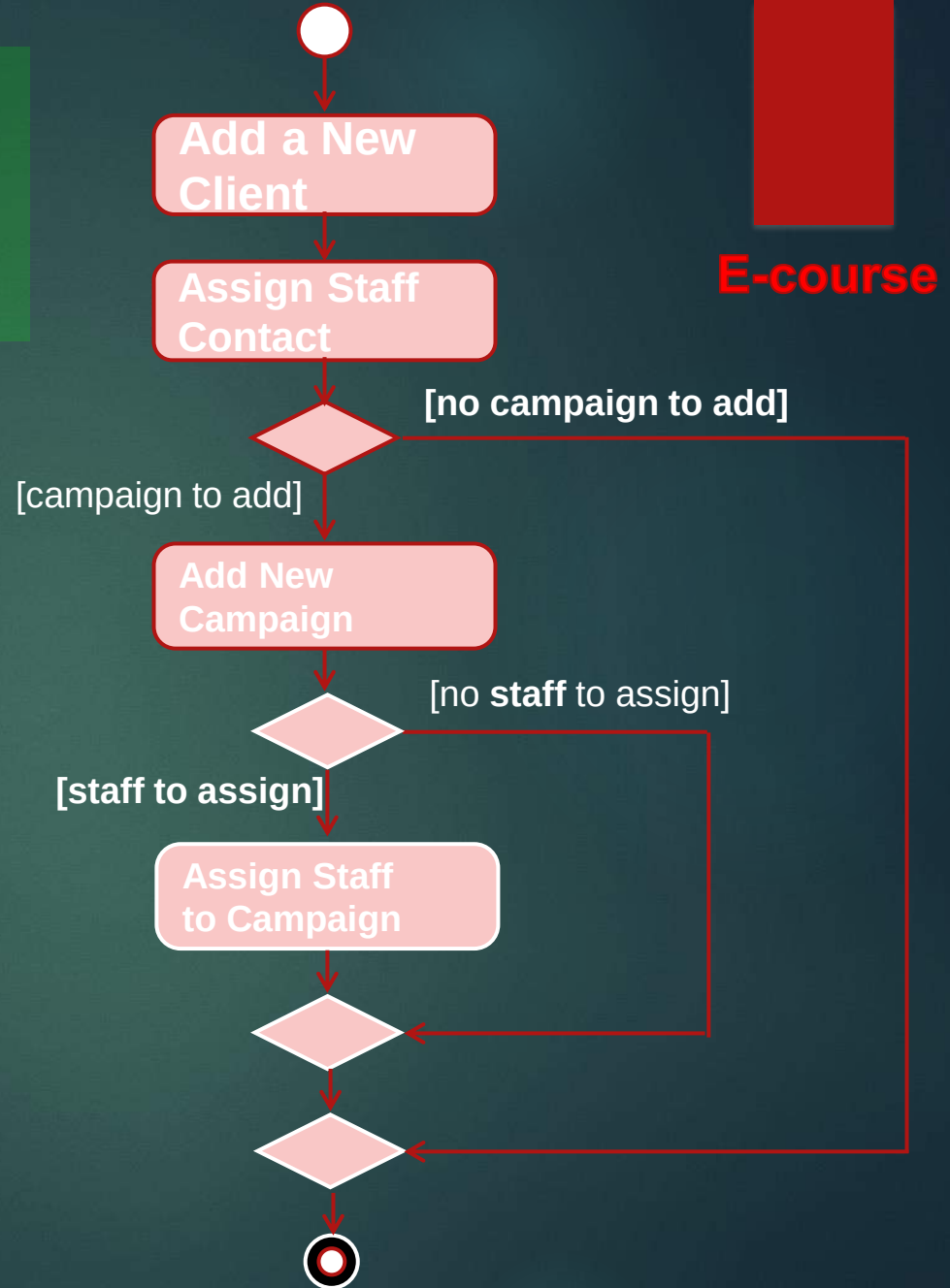
Drawing Activity Diagrams

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- ▶ Identify any alternative flows and the conditions on them
 - ▶ sometimes there is a new campaign to add for a new client, sometimes not
 - ▶ sometimes they will want to assign staff to the campaign, sometimes not
- ▶ Add decision and merge nodes, flows and guard conditions to the diagram



Drawing Activity Diagrams



Drawing Activity Diagrams

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- ▶ Identify any actions that are carried out in parallel
 - ▶ there are none in this example
- ▶ Add fork and join nodes and flows to the diagram

Drawing Activity Diagrams

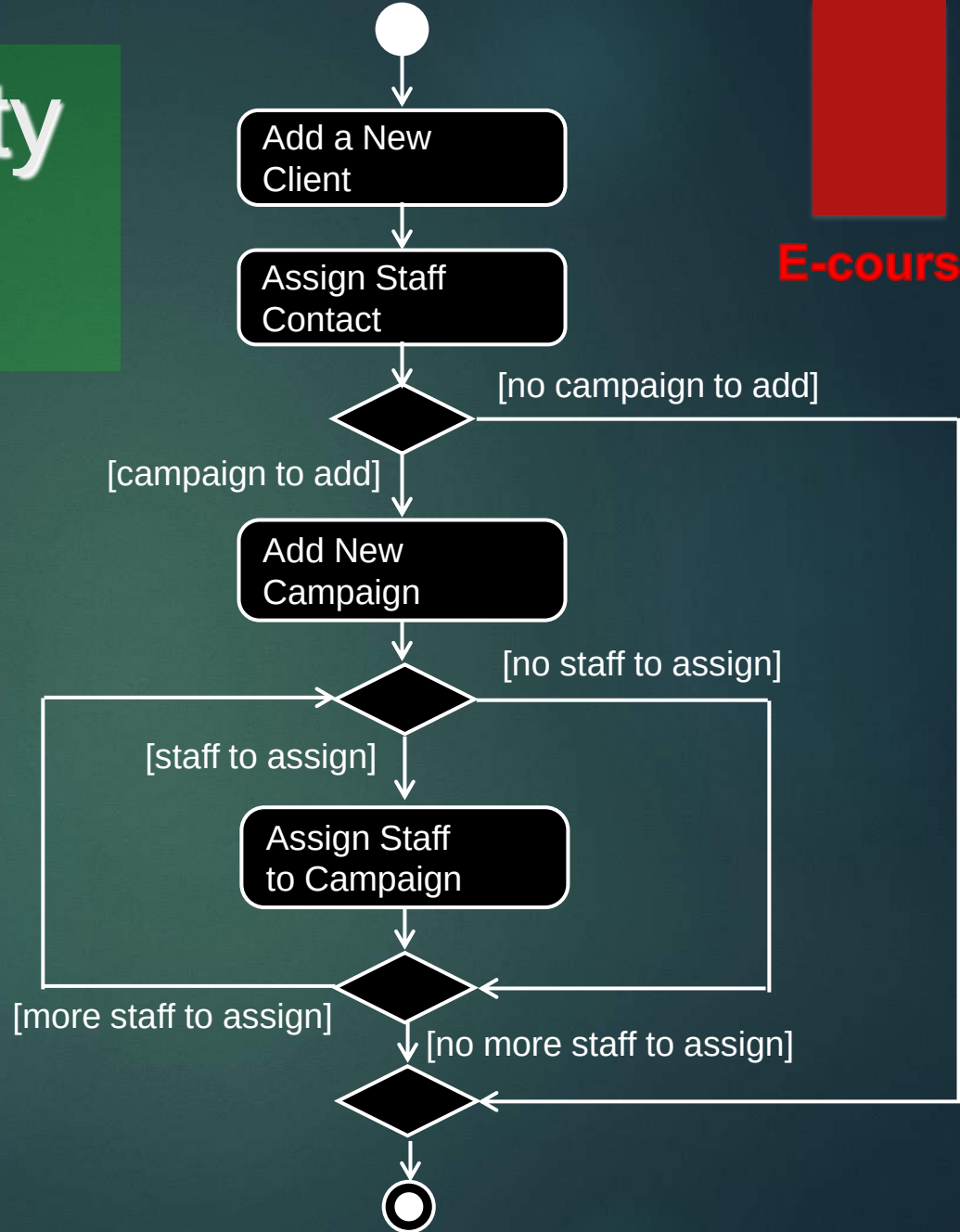
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- ▶ Identify any processes that are repeated
 - ▶ they will want to assign staff to the campaign until there are no more staff to add
- ▶ Add decision and merge nodes, flows and guard conditions to the diagram



Drawing Activity Diagrams

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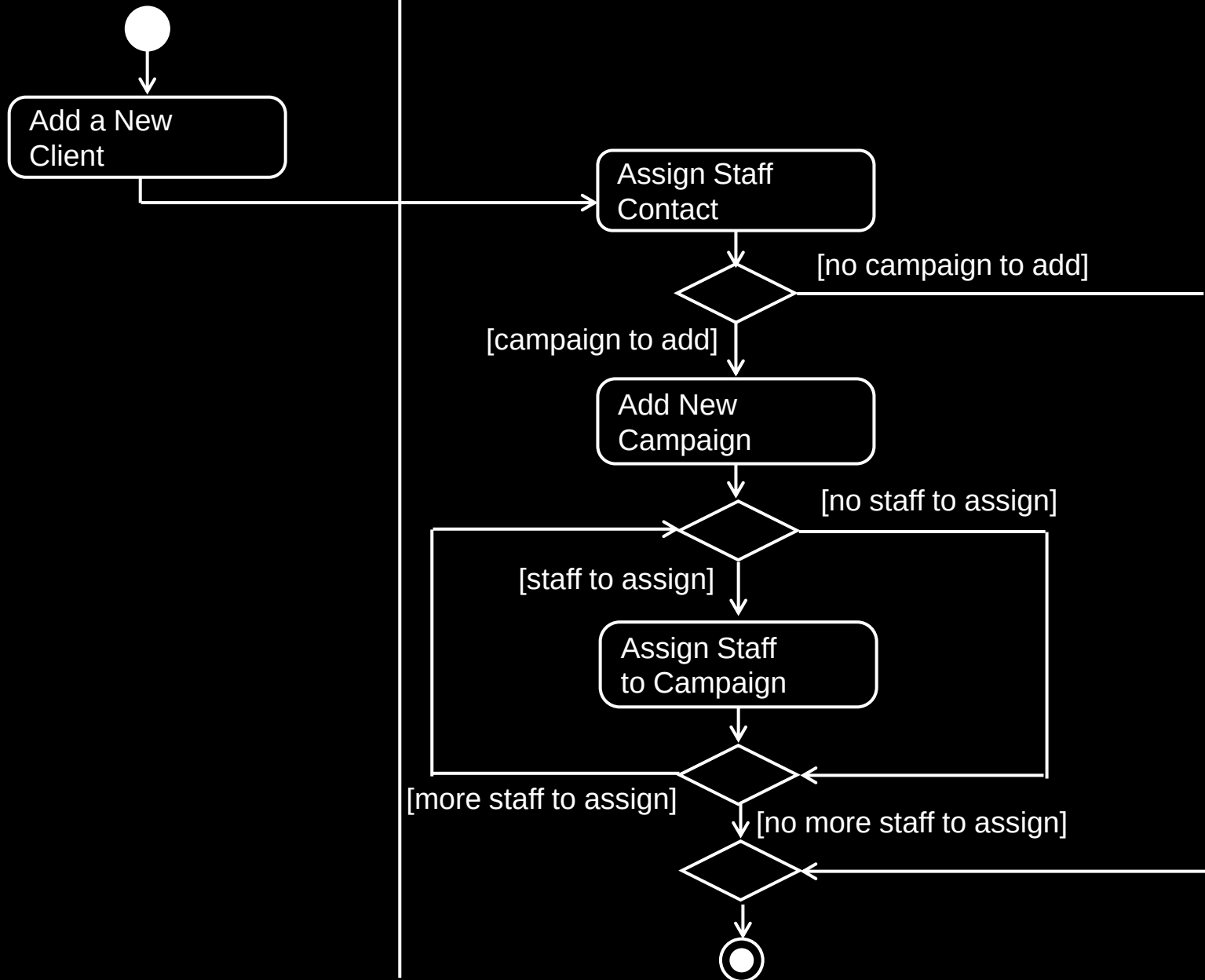
Drawing Activity Diagrams

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- ▶ Are all the activities carried out by the same person, organisation or department?
- ▶ If not, then add swimlanes to show the responsibilities
- ▶ Name the swimlanes
- ▶ Show each activity in the appropriate swimlane

Administrator

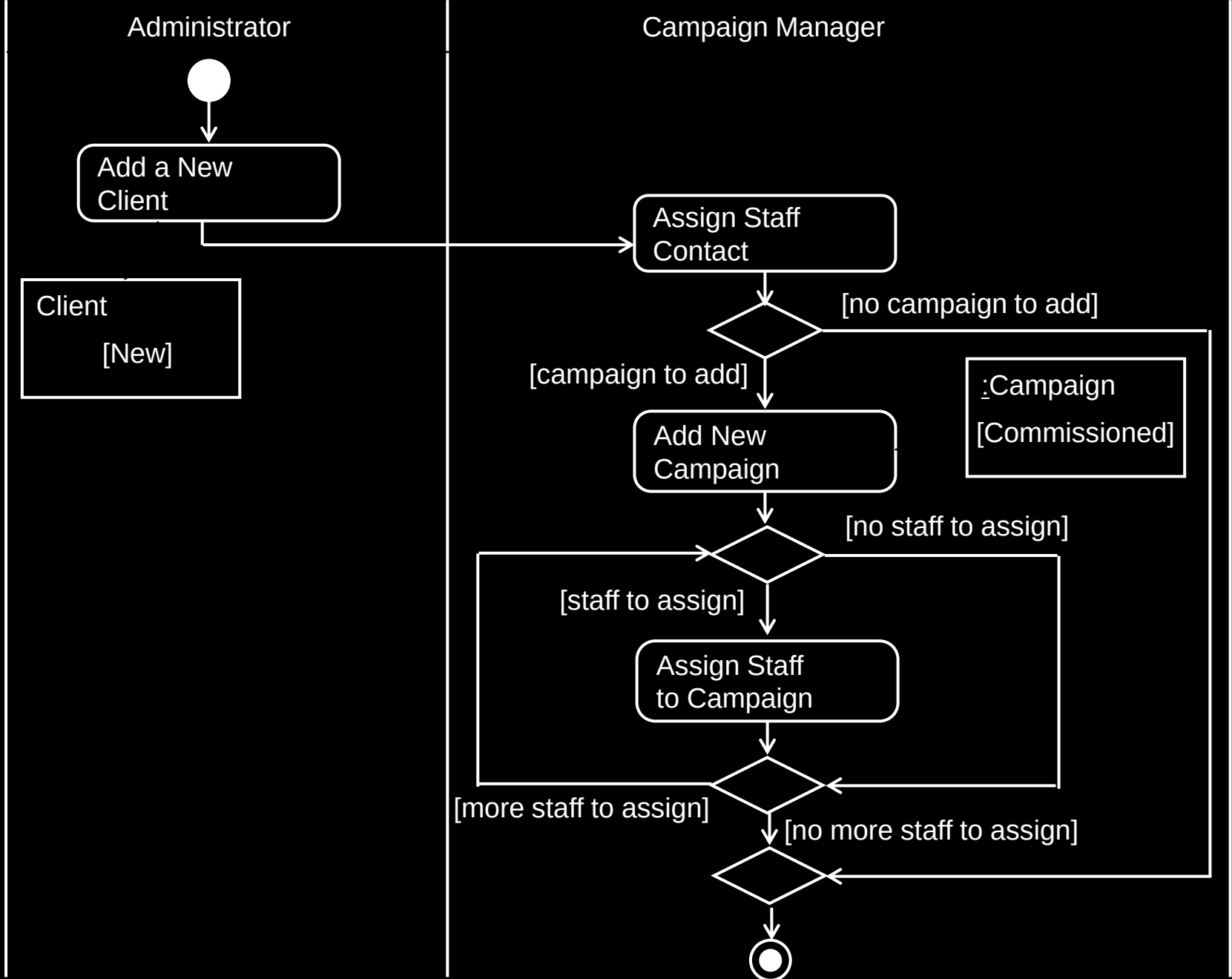
Campaign Manager



Drawing Activity Diagrams

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- ▶ Are there any object flows and objects to show?
 - ▶ these can be documents that are created or updated in a business activity diagram
 - ▶ these can be object instances that change state in an operation or a use case
- ▶ Add the object flows and objects



General Rules: Code Translation

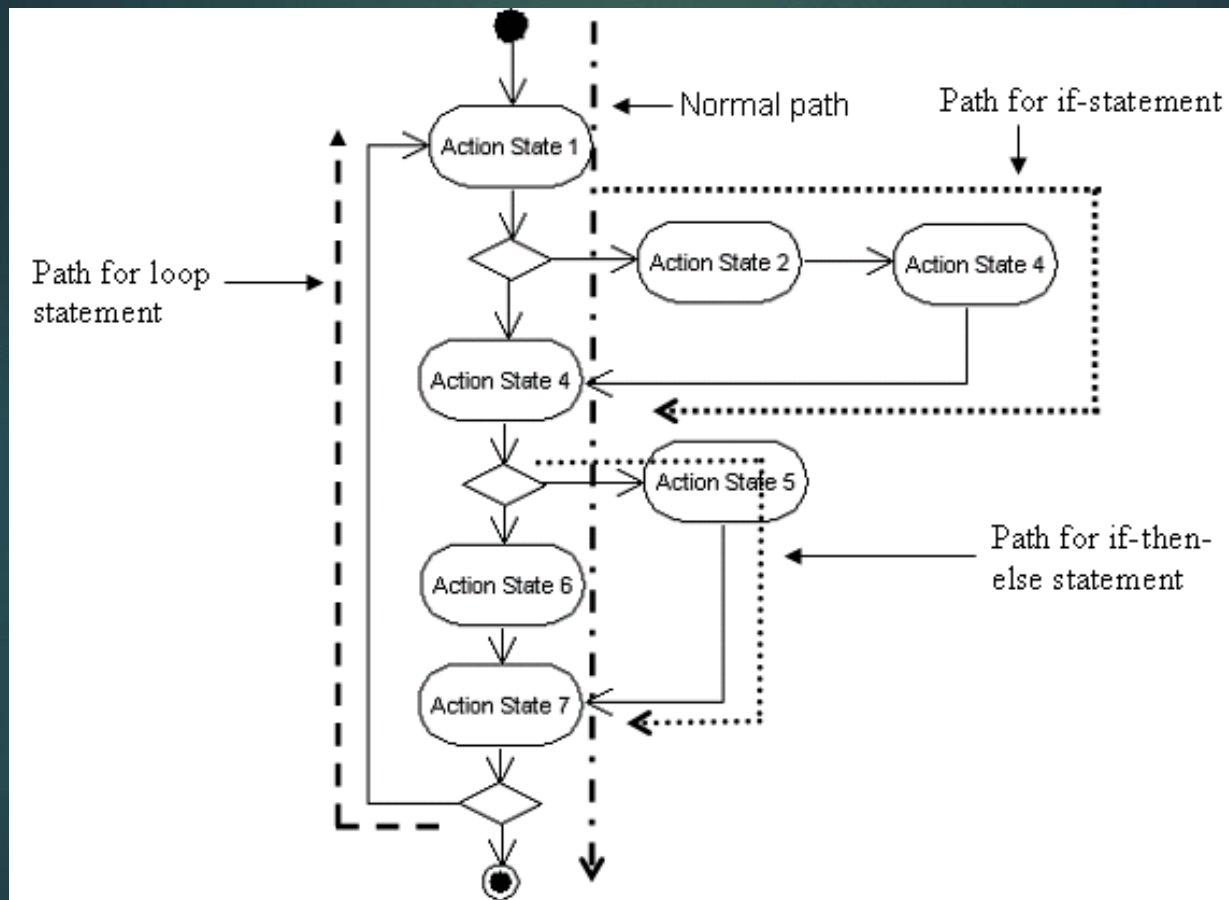
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- ▶ The following are the general rules for translating the elements of an activity diagram into program code:
 - ▶ Action state. It is translated to statements of actions, such as method calls, computational statements.
 - ▶ Conditional branch. It is translated to an if-then-else statement.
 - ▶ Concurrent branch. It is translated to threads for each additional control flow.
 - ▶ Loop. A loop in the activity diagram is translated to a while-loop statement.



General Rules: Code Translation (cont'd)

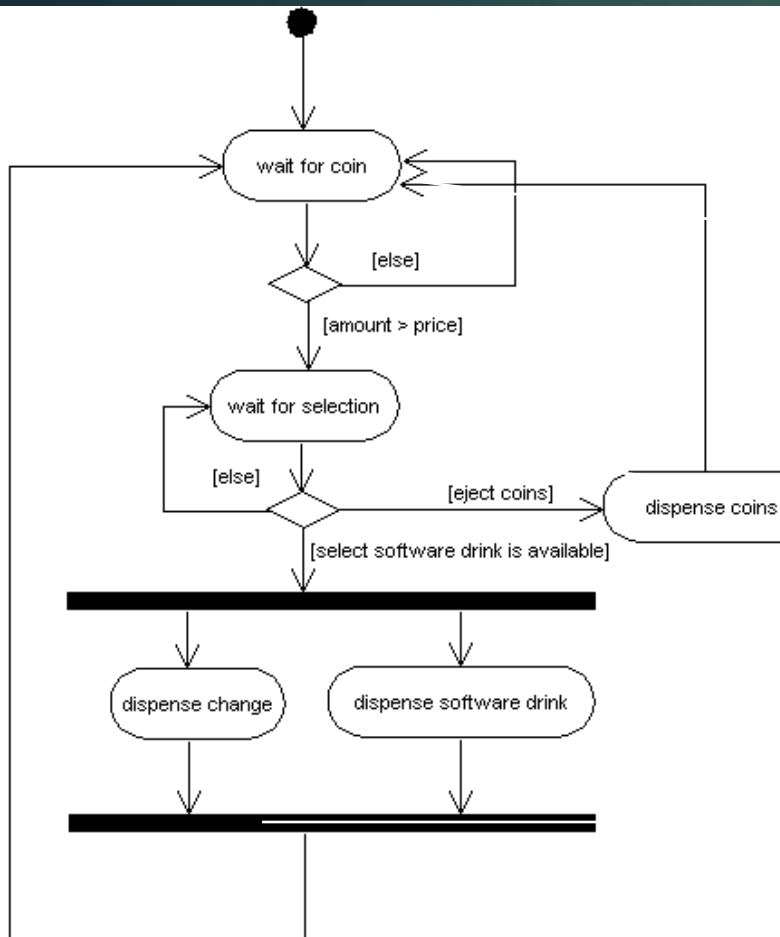
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General Rules: Code Translation

(Cont'd) Example – Control Object of the Simplified Vending Machine

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```
while (true) {
    amount = 0.0;
    while (amount < price) {
        wait for a coin;
        add coin value to amount;
    }
    show all available soft drink;
    while (selection is not done) {
        wait for selection from user;
        if selection is "eject coins" {
            dispense coins;
            set selection to "done";
        }
        else if selection is a valid soft drink {
            dispense change & soft drink concurrently;
            set selection to "done"
        }
    }
}
```

References

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- ▶ The notation and semantics of activity diagrams have changed significantly since UML was first released. The original UML books are now out of date on the subject.
- ▶ Bennett, Skelton and Lunn (2005)
(For full bibliographic details, see Bennett, McRobb and Farmer)
- ▶ Object-Oriented Technology - From Diagram to Code with Visual Paradigm for UML, Curtis H.K. Tsang, Clarence S.W. Lau and Y.K. Leung, McGraw-Hill Education (Asia), 2005



WE FOCUS ON KNOWLEDGE-BASED ON EDUCATION

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